

## THE INVENTOR CLAIMS:

1. A batch blend to produce a glass composition useful  
for forming glass fibers of high heat resistance, comprising:

$\text{SiO}_2$  in an amount ranging from about 46.0 to about 71.0  
weight percent,

$\text{Al}_2\text{O}_3$  in an amount ranging from about 9.0 to about 26.0  
weight percent,

$\text{Na}_2\text{O}$  in an amount ranging from about 0 to about 5.80 weight  
percent,

$\text{K}_2\text{O}$  in an amount ranging from about 0 to about 5.70 weight  
percent,

$\text{CaO}$  in an amount ranging from about 3.76 to about 10.5  
weight percent,

$\text{MgO}$  in an amount ranging from about 1.84 to about 10.5  
weight percent,

$\text{Fe}_2\text{O}_3 + \text{FeO}$  in an amount ranging from about 4.64 to about  
15.5 weight percent, and

$\text{TiO}_2$  in an amount ranging from about 0.72 to about 3.0  
weight percent.

2        2.    The batch blend of Claim 1, wherein the resulting  
composition is essentially free of  $\text{Na}_2\text{O}$  and  $\text{K}_2\text{O}$ .

2        3.    A batch blend to produce a glass composition useful  
for forming glass fibers of high heat resistance, comprising:

$\text{SiO}_2$     in an amount of about 46.23 weight percent,

4         $\text{Al}_2\text{O}_3$  in an amount of about 25.91 weight percent,

$\text{Na}_2\text{O}$  in an amount of about 2.40 weight percent,

6         $\text{K}_2\text{O}$  in an amount of about 0.82 weight percent,

$\text{CaO}$  in an amount of about 8.27 weight percent,

8         $\text{MgO}$  in an amount of about 4.06 weight percent,

$\text{Fe}_2\text{O}_3 + \text{FeO}$  in an amount of about 10.22 weight percent,

10        $\text{TiO}_2$  in an amount of about 1.58 weight percent,

$\text{ZrO}_2$  in an amount of about 0.01 weight percent,

12        $\text{P}_2\text{O}_5$  in an amount of about 0.28 weight percent, and

$\text{MnO}$  in an amount of about 0.23 weight percent.

4. The batch blend of Claim 3, wherein the resulting  
composition is essentially free of  $\text{ZrO}_2$ .

5. A batch blend to produce a glass composition useful  
for forming glass fibers of high heat resistance, comprising:

$\text{SiO}_2$  in an amount of about 61.03 weight percent,

$\text{Al}_2\text{O}_3$  in an amount of about 11.71 weight percent,

$\text{Na}_2\text{O}$  in an amount of about 2.35 weight percent,

$\text{K}_2\text{O}$  in an amount of about 0.80 weight percent,

$\text{CaO}$  in an amount of about 8.10 weight percent,

$\text{MgO}$  in an amount of about 3.97 weight percent,

$\text{Fe}_2\text{O}_3 + \text{FeO}$  in an amount of about 9.99 weight percent,

$\text{TiO}_2$  in an amount of about 1.55 weight percent,

$\text{ZrO}_2$  in an amount of about 0 weight percent,

$\text{P}_2\text{O}_5$  in an amount of about 0.27 weight percent, and

$\text{MnO}$  in an amount of about 0.23 weight percent.

6. A batch blend to produce a glass composition useful  
2 for forming glass fibers of high heat resistance, comprising:

SiO<sub>2</sub> in an amount of about 64.95 weight percent,

4 Al<sub>2</sub>O<sub>3</sub> in an amount of about 11.13 weight percent,

Na<sub>2</sub>O in an amount of about 2.24 weight percent,

6 K<sub>2</sub>O in an amount of about 2.24 weight percent,

CaO in an amount of about 3.76 weight percent,

8 MgO in an amount of about 3.77 weight percent,

Fe<sub>2</sub>O<sub>3</sub>+FeO in an amount of about 9.51 weight percent,

10 TiO<sub>2</sub> in an amount of about 1.47 weight percent

ZrO<sub>2</sub> in an amount of about 0.01 weight percent,

12 P<sub>2</sub>O<sub>5</sub> in an amount of about 0.70 weight percent, and

MnO in an amount of about 0.22 weight percent.

7. The batch blend of Claim 6, wherein the resulting  
2 composition is essentially free of ZrO<sub>2</sub>.

8. A batch blend to produce a glass composition useful  
for forming glass fibers of high heat resistance, comprising:

$\text{SiO}_2$  in an amount of about 53.69 weight percent,

$\text{Al}_2\text{O}_3$  in an amount of about 13.84 weight percent,

$\text{Na}_2\text{O}$  in an amount of about 2.79 weight percent,

$\text{K}_2\text{O}$  in an amount of about 0.95 weight percent,

$\text{CaO}$  in an amount of about 9.61 weight percent,

$\text{MgO}$  in an amount of about 4.71 weight percent,

$\text{Fe}_2\text{O}_3 + \text{FeO}$  in an amount of about 11.87 weight percent,

$\text{TiO}_2$  in an amount of about 1.83 weight percent,

$\text{ZrO}_2$  in an amount of about 0 weight percent,

$\text{P}_2\text{O}_5$  in an amount of about 0.38 weight percent, and

$\text{MnO}$  in an amount of about 0.33 weight percent.

9. A batch blend to produce a glass composition useful  
2 for forming glass fibers of high heat resistance, comprising:

SiO<sub>2</sub> in an amount of about 55.25 weight percent,

4 Al<sub>2</sub>O<sub>3</sub> in an amount of about 18.25 weight percent,

Na<sub>2</sub>O in an amount of about 2.30 weight percent,

6 K<sub>2</sub>O in an amount of about 1.80 weight percent,

CaO in an amount of about 8.38 weight percent,

8 MgO in an amount of about 3.97 weight percent,

Fe<sub>2</sub>O<sub>3</sub>+FeO in an amount of about 8.50 weight percent,

10 TiO<sub>2</sub> in an amount of about 1.09 weight percent,

ZrO<sub>2</sub> in an amount of about 0.31 weight percent,

12 P<sub>2</sub>O<sub>5</sub> in an amount of about 0.20 weight percent, and

MnO in an amount of about 0.18 weight percent.

10. A batch blend to produce a glass composition useful  
for forming glass fibers of high heat resistance, comprising:

$\text{SiO}_2$  in an amount of about 67.55 weight percent,

$\text{Al}_2\text{O}_3$  in an amount of about 9.76 weight percent,

$\text{Na}_2\text{O}$  in an amount of about 1.96 weight percent,

$\text{K}_2\text{O}$  in an amount of about 0.67 weight percent,

$\text{CaO}$  in an amount of about 6.74 weight percent,

$\text{MgO}$  in an amount of about 3.30 weight percent,

$\text{Fe}_2\text{O}_3 + \text{FeO}$  in an amount of about 8.32 weight percent,

$\text{TiO}_2$  in an amount of about 1.28 weight percent,

$\text{ZrO}_2$  in an amount of about 0.01 weight percent,

$\text{P}_2\text{O}_5$  in an amount of about 0.22 weight percent, and

$\text{MnO}$  in an amount of about 0.19 weight percent.

11. The batch blend of Claim 10, wherein the resulting  
2 composition is essentially free of  $\text{ZrO}_2$ .

12. A batch blend to produce a glass composition useful for  
2 forming glass fibers of high heat resistance, comprising:

$\text{SiO}_2$  in an amount of about 70.02 weight percent,  
4  $\text{Al}_2\text{O}_3$  in an amount of about 10.14 weight percent,  
 $\text{Na}_2\text{O}$  in an amount of about 2.03 weight percent,  
6  $\text{K}_2\text{O}$  in an amount of about 0.01 weight percent,  
 $\text{CaO}$  in an amount of about 6.53 weight percent,  
8  $\text{MgO}$  in an amount of about 4.26 weight percent,  
 $\text{Fe}_2\text{O}_3 + \text{FeO}$  in an amount of about 5.26 weight percent,  
10  $\text{TiO}_2$  in an amount of about 1.33 weight percent,  
 $\text{ZrO}_2$  in an amount of about 0 weight percent,  
12  $\text{P}_2\text{O}_5$  in an amount of about 0 weight percent, and  
 $\text{MnO}$  in an amount of about 0 weight percent.



13. A batch blend to produce a glass composition useful  
for forming glass fibers of high heat resistance, comprising:

$\text{SiO}_2$  in an amount of about 46.47 weight percent,

$\text{Al}_2\text{O}_3$  in an amount of about 25.91 weight percent,

$\text{Na}_2\text{O}$  in an amount of about 2.41 weight percent,

$\text{K}_2\text{O}$  in an amount of about 0.95 weight percent,

$\text{CaO}$  in an amount of about 8.31 weight percent,

$\text{MgO}$  in an amount of about 4.08 weight percent,

$\text{Fe}_2\text{O}_3 + \text{FeO}$  in an amount of about 10.27 weight percent, and

$\text{TiO}_2$  in an amount of about 1.60 weight percent.

14. A batch blend to produce a glass composition useful  
2 for forming glass fibers of high heat resistance, comprising:

$\text{SiO}_2$  in an amount of about 66.92 weight percent,

4  $\text{Al}_2\text{O}_3$  in an amount of about 11.42 weight percent,

$\text{Na}_2\text{O}$  in an amount of about 2.59 weight percent,

6  $\text{K}_2\text{O}$  in an amount of about 2.59 weight percent,

$\text{CaO}$  in an amount of about 3.81 weight percent,

8  $\text{MgO}$  in an amount of about 4.01 weight percent,

$\text{Fe}_2\text{O}_3 + \text{FeO}$  in an amount of about 8.66 weight percent, and

10  $\text{TiO}_2$  in an amount of about 0.72 weight percent.

15. A batch blend to produce a glass composition useful  
2 for forming glass fibers of high heat resistance, comprising:

$\text{SiO}_2$  in an amount of about 55.50 weight percent,

4  $\text{Al}_2\text{O}_3$  in an amount of about 18.33 weight percent,

$\text{Na}_2\text{O}$  in an amount of about 2.31 weight percent,

6  $\text{K}_2\text{O}$  in an amount of about 1.81 weight percent,

$\text{CaO}$  in an amount of about 8.42 weight percent,

8  $\text{MgO}$  in an amount of about 3.99 weight percent,

$\text{Fe}_2\text{O}_3 + \text{FeO}$  in an amount of about 8.54 weight percent, and

10  $\text{TiO}_2$  in an amount of about 1.10 weight percent.

16. A batch blend to produce a glass composition useful  
for forming glass fibers of high heat resistance, comprising:

$\text{SiO}_2$  in an amount of about 67.83 weight percent,

$\text{Al}_2\text{O}_3$  in an amount of about 9.80 weight percent,

$\text{Na}_2\text{O}$  in an amount of about 1.97 weight percent,

$\text{K}_2\text{O}$  in an amount of about 0.67 weight percent,

$\text{CaO}$  in an amount of about 6.77 weight percent,

$\text{MgO}$  in an amount of about 3.31 weight percent,

$\text{Fe}_2\text{O}_3 + \text{FeO}$  in an amount of about 8.36 weight percent, and

$\text{TiO}_2$  in an amount of about 1.29 weight percent.

17. A batch blend to produce a glass composition useful  
for forming glass fibers of high heat resistance, comprising:

$\text{SiO}_2$  in an amount of about 70.31 weight percent,

$\text{Al}_2\text{O}_3$  in an amount of about 10.18 weight percent,

$\text{Na}_2\text{O}$  in an amount of about 2.03 weight percent,

$\text{K}_2\text{O}$  in an amount of about 0.01 weight percent,

$\text{CaO}$  in an amount of about 6.55 weight percent,

$\text{MgO}$  in an amount of about 4.27 weight percent,

$\text{Fe}_2\text{O}_3 + \text{FeO}$  in an amount of about 5.28 weight percent, and

$\text{TiO}_2$  in an amount of about 1.37 weight percent.

18. The blend according to Claim 13, wherein the batch is  
substantially free of  $\text{TiO}_2$  and is resistant to heat and fire for a  
substantial period of at least three hours to prevent burn-through  
by the conversion of at least a portion of the fibers into a fiber  
mat of ceram glass.

19. The blend according to Claim 14, wherein the batch is  
substantially free of  $\text{TiO}_2$  and is resistant to heat and fire for a  
substantial period of at least three hours to prevent burn-through  
by the conversion of at least a portion of the fibers into a fiber  
mat of ceram glass.

20. The blend according to Claim 17, wherein the batch is  
substantially free of  $\text{TiO}_2$  and is resistant to heat and fire for a  
substantial period of at least three hours to prevent burn-through  
by the conversion of at least a portion of the fibers into a fiber  
mat of ceram glass.

21. A batch blend to produce a glass composition useful  
for forming glass fibers of high heat resistance, comprising:

$\text{SiO}_2$  in an amount ranging from about 49.0 to about 76.0  
weight percent,

$\text{B}_2\text{O}_3$  in an amount ranging from about 0 to about 9 weight  
percent,

$\text{Li}_2\text{O}$  in an amount ranging from about 0 to about 9 weight  
percent,

$\text{Al}_2\text{O}_3$  in an amount ranging from about 2.0 to about 26.0  
weight percent,

$\text{Na}_2\text{O}$  in an amount ranging from about 0 to about 12.0  
weight percent,

$\text{K}_2\text{O}$  in an amount ranging from about 0 to about 6.0 weight  
percent,

$\text{CaO}$  in an amount ranging from about 3.0 to about 15.0  
weight percent,

$\text{MgO}$  in an amount ranging from about 2.0 to about 15.0  
weight percent,

$\text{Fe}_2\text{O}_3 + \text{FeO}$  in an amount ranging from about 1.0 to about  
18.0 weight percent,

$\text{TiO}_2$  in an amount ranging from about 0 to about 4.0 weight  
percent, and

$\text{P}_2\text{O}_5$  in an amount ranging from about 0 to about 4.0  
weight percent.

22. A batch blend to produce a glass composition useful  
2 for forming glass fibers of high heat resistance, comprising:

$\text{SiO}_2$  in an amount of about 67.55 weight percent,

4  $\text{Al}_2\text{O}_3$  in an amount of about 9.76 weight percent,

$\text{Na}_2\text{O}$  in an amount of about 0.67 weight percent,

6  $\text{B}_2\text{O}_3$  in an amount of about 1.96 weight percent,

$\text{CaO}$  in an amount of about 6.74 weight percent,

8  $\text{MgO}$  in an amount of about 3.30 weight percent,

$\text{Fe}_2\text{O}_3 + \text{FeO}$  in an amount of about 8.32 weight percent,

10  $\text{TiO}_2$  in an amount of about 1.28 weight percent,

$\text{ZrO}_2$  in an amount of about 0.01 weight percent,

12  $\text{P}_2\text{O}_5$  in an amount of about 0.22 weight percent, and

$\text{MnO}$  in an amount of about 0.19 weight percent.



23. A batch blend to produce a glass composition useful  
for forming glass fibers of high heat resistance, comprising:

$\text{SiO}_2$  in an amount of about 67.55 weight percent,

$\text{Al}_2\text{O}_3$  in an amount of about 9.76 weight percent,

$\text{Na}_2\text{O}$  in an amount of about 0.67 weight percent,

$\text{Li}_2\text{O}$  in an amount of about 1.96 weight percent,

$\text{CaO}$  in an amount of about 6.74 weight percent,

$\text{MgO}$  in an amount of about 3.30 weight percent,

$\text{Fe}_2\text{O}_3 + \text{FeO}$  in an amount of about 8.32 weight percent,

$\text{TiO}_2$  in an amount of about 1.28 weight percent,

$\text{ZrO}_2$  in an amount of about 0.01 weight percent,

$\text{P}_2\text{O}_5$  in an amount of about 0.22 weight percent, and

$\text{MnO}$  in an amount of about 0.19 weight percent.

24. A batch blend to produce a glass composition useful  
for forming glass fibers of high heat resistance, comprising:

$\text{SiO}_2$  in an amount of about 67.55 weight percent,

$\text{Al}_2\text{O}_3$  in an amount of about 9.76 weight percent,

$\text{Na}_2\text{O}$  in an amount of about 0.67 weight percent,

$\text{K}_2\text{O}$  in an amount of about 1.96 weight percent,

$\text{CaO}$  in an amount of about 6.74 weight percent,

$\text{MgO}$  in an amount of about 3.30 weight percent,

$\text{Fe}_2\text{O}_3 + \text{FeO}$  in an amount of about 8.32 weight percent,

$\text{TiO}_2$  in an amount of about 1.28 weight percent,

$\text{ZrO}_2$  in an amount of about 0.01 weight percent,

$\text{P}_2\text{O}_5$  in an amount of about 0.22 weight percent, and

$\text{MnO}$  in an amount of about 0.19 weight percent.

25. A batch blend to produce a glass composition useful  
for forming glass fibers of high heat resistance, comprising:

$\text{SiO}_2$  in an amount of about 49.0 weight percent,

$\text{Al}_2\text{O}_3$  in an amount of about 23.0 weight percent,

$\text{B}_2\text{O}_3$  in an amount of about 2.35 weight percent,

$\text{Na}_2\text{O}$  in an amount of about 1.04 weight percent,

$\text{CaO}$  in an amount of about 8.31 weight percent,

$\text{MgO}$  in an amount of about 4.08 weight percent,

$\text{Fe}_2\text{O}_3 + \text{FeO}$  in an amount of about 10.27 weight percent, and

$\text{TiO}_2$  in an amount of about 1.59 weight percent.

26. A batch blend to produce a glass composition useful  
for forming glass fibers of high heat resistance, comprising:

$\text{SiO}_2$  in an amount of about 67.36 weight percent,

$\text{Al}_2\text{O}_3$  in an amount of about 9.76 weight percent,

$\text{Li}_2\text{O}$  in an amount of about 2.86 weight percent,

$\text{Na}_2\text{O}$  in an amount of about 1.00 weight percent,

$\text{CaO}$  in an amount of about 5.28 weight percent,

$\text{MgO}$  in an amount of about 3.80 weight percent,

$\text{Fe}_2\text{O}_3 + \text{FeO}$  in an amount of about 8.46 weight percent, and

$\text{TiO}_2$  in an amount of about 1.48 weight percent.

27. A batch blend to produce a glass composition useful  
for forming glass fibers of high heat resistance, comprising:

$\text{SiO}_2$  in an amount of about 65.16 weight percent,

$\text{Al}_2\text{O}_3$  in an amount of about 11.18 weight percent,

$\text{B}_2\text{O}_3$  in an amount of about 3.01 weight percent,

$\text{CaO}$  in an amount of about 7.14 weight percent,

$\text{MgO}$  in an amount of about 3.99 weight percent,

$\text{Fe}_2\text{O}_3 + \text{FeO}$  in an amount of about 8.95 weight percent, and

$\text{TiO}_2$  in an amount of about 0.57 weight percent.

28. A batch blend to produce a glass composition useful  
for forming glass fibers of high heat resistance, comprising:

$\text{SiO}_2$  in an amount of about 56.01 weight percent,

$\text{Al}_2\text{O}_3$  in an amount of about 13.92 weight percent,

$\text{B}_2\text{O}_3$  in an amount of about 4.01 weight percent,

$\text{Na}_2\text{O}$  in an amount of about 2.92 weight percent,

$\text{K}_2\text{O}$  in an amount of about 0.96 weight percent,

$\text{CaO}$  in an amount of about 8.40 weight percent,

$\text{Fe}_2\text{O}_3 + \text{FeO}$  in an amount of about 11.94 weight percent, and

$\text{TiO}_2$  in an amount of about 1.84 weight percent.

29. A batch blend to produce a glass composition useful  
2 for forming glass fibers of high heat resistance, comprising:

$\text{SiO}_2$  in an amount of about 66.51 weight percent,

4  $\text{Al}_2\text{O}_3$  in an amount of about 9.34 weight percent,

$\text{Li}_2\text{O}$  in an amount of about 3.41 weight percent,

6  $\text{Na}_2\text{O}$  in an amount of about 2.81 weight percent,

$\text{CaO}$  in an amount of about 6.41 weight percent,

8  $\text{MgO}$  in an amount of about 2.99 weight percent, and

$\text{Fe}_2\text{O}_3 + \text{FeO}$  in an amount of about 8.53 weight percent.

30. A batch blend to produce a glass composition useful  
2 for forming glass fibers of high heat resistance, comprising:

$\text{SiO}_2$  in an amount of about 68.00 weight percent,

4  $\text{Al}_2\text{O}_3$  in an amount of about 9.06 weight percent,

$\text{B}_2\text{O}_3$  in an amount of about 2.01 weight percent,

6  $\text{Na}_2\text{O}$  in an amount of about 2.33 weight percent,

$\text{K}_2\text{O}$  in an amount of about 0.42 weight percent,

8  $\text{CaO}$  in an amount of about 6.23 weight percent,

$\text{MgO}$  in an amount of about 3.06 weight percent,

10  $\text{Fe}_2\text{O}_3 + \text{FeO}$  in an amount of about 7.70 weight percent, and

$\text{TiO}_2$  in an amount of about 1.19 weight percent.



31. A batch blend to produce a glass composition useful  
for forming glass fibers of high heat resistance, comprising:

$\text{SiO}_2$  in an amount of about 65.24 weight percent,

$\text{Al}_2\text{O}_3$  in an amount of about 2.50 weight percent,

$\text{B}_2\text{O}_3$  in an amount of about 6.00 weight percent,

$\text{Na}_2\text{O}$  in an amount of about 13.00 weight percent,

$\text{CaO}$  in an amount of about 6.70 weight percent,

$\text{MgO}$  in an amount of about 1.85 weight percent,

$\text{Fe}_2\text{O}_3 + \text{FeO}$  in an amount of about 4.01 weight percent, and

$\text{TiO}_2$  in an amount of about 0.70 weight percent.

32. A batch blend to produce a glass composition useful  
for forming glass fibers of high heat resistance, comprising:

$\text{SiO}_2$  in an amount of about 67.50 weight percent,

$\text{Al}_2\text{O}_3$  in an amount of about 9.34 weight percent,

$\text{Li}_2\text{O}$  in an amount of about 2.31 weight percent,

$\text{K}_2\text{O}$  in an amount of about 0.81 weight percent,

$\text{CaO}$  in an amount of about 8.41 weight percent,

$\text{MgO}$  in an amount of about 2.00 weight percent,

$\text{Fe}_2\text{O}_3 + \text{FeO}$  in an amount of about 8.53 weight percent, and

$\text{TiO}_2$  in an amount of about 1.10 weight percent.

33. A batch blend to produce a glass composition useful  
2 for forming glass fibers of high heat resistance, comprising:

$\text{SiO}_2$  in an amount of about 46.47 weight percent,

4  $\text{Al}_2\text{O}_3$  in an amount of about 25.91 weight percent,

$\text{B}_2\text{O}_3$  in an amount of about 2.41 weight percent,

6  $\text{Na}_2\text{O}$  in an amount of about 2.55 weight percent,

$\text{CaO}$  in an amount of about 8.31 weight percent,

8  $\text{MgO}$  in an amount of about 4.08 weight percent, and

$\text{Fe}_2\text{O}_3 + \text{FeO}$  in an amount of about 10.27 weight percent.

34. A batch blend to produce a glass composition useful for  
2 forming glass fibers of high heat resistance, comprising:

$\text{SiO}_2$  in an amount of about 66.92 weight percent,

4  $\text{Al}_2\text{O}_3$  in an amount of about 11.42 weight percent,

$\text{Na}_2\text{O}$  in an amount of about 2.59 weight percent,

6  $\text{B}_2\text{O}_3$  in an amount of about 4.24 weight percent,

$\text{CaO}$  in an amount of about 4.02 weight percent,

8  $\text{MgO}$  in an amount of about 0.81 weight percent, and

$\text{Fe}_2\text{O}_3 + \text{FeO}$  in an amount of about 10.00 weight percent.

35. A batch blend to produce a glass composition useful for  
2 forming glass fibers of high heat resistance, comprising:

$\text{SiO}_2$  in an amount of about 70.31 weight percent,

4  $\text{Al}_2\text{O}_3$  in an amount of about 8.30 weight percent,

$\text{Na}_2\text{O}$  in an amount of about 2.03 weight percent,

6  $\text{B}_2\text{O}_3$  in an amount of about 1.01 weight percent,

$\text{CaO}$  In an amount of about 6.55 weight percent,

8  $\text{MgO}$  in an amount of about 3.27 weight percent, and

$\text{Fe}_2\text{O}_3 + \text{FeO}$  in an amount of about 8.53 weight percent.